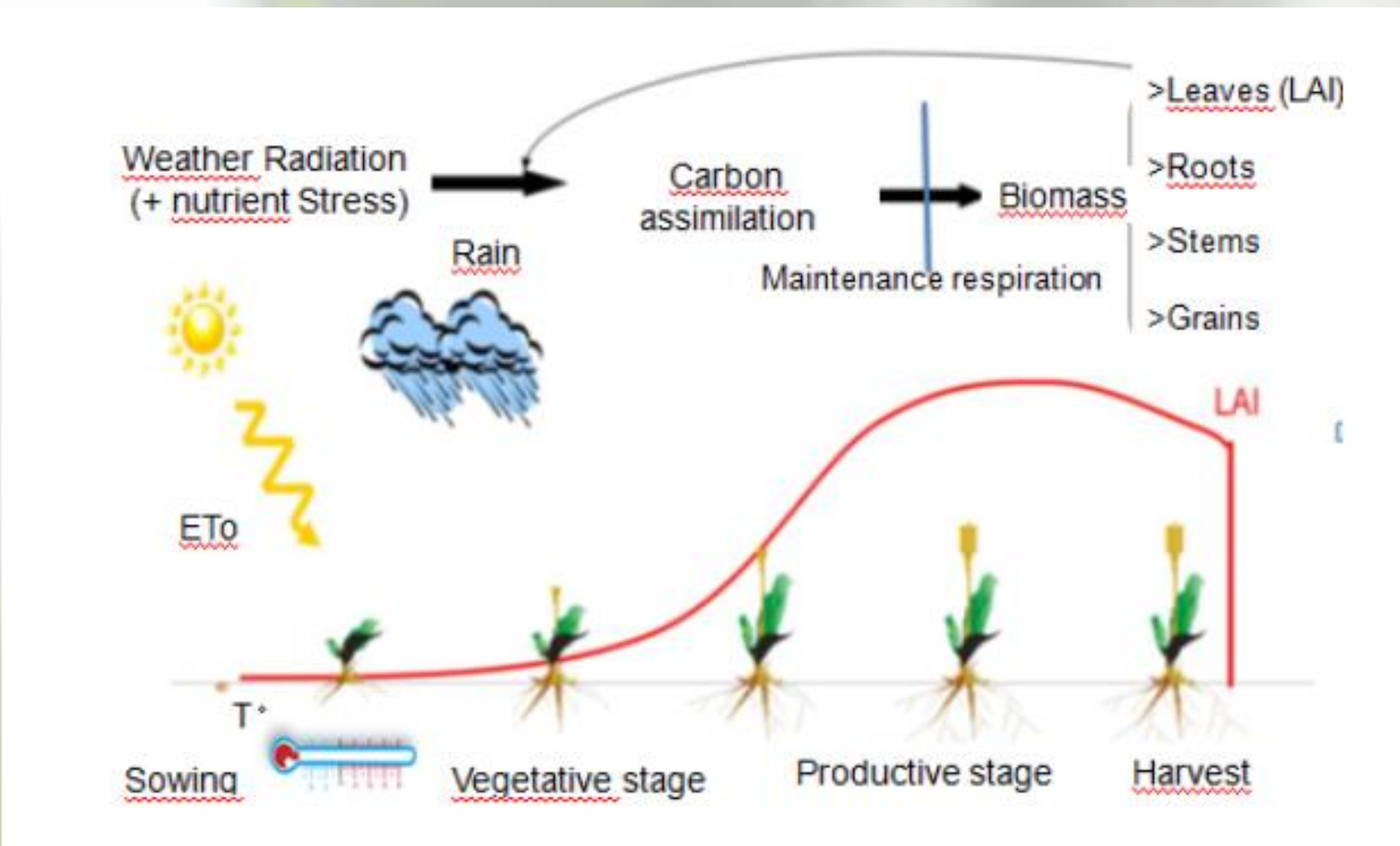


SAMARA : between a Functional Structural Plant Model and an Agronomic Model

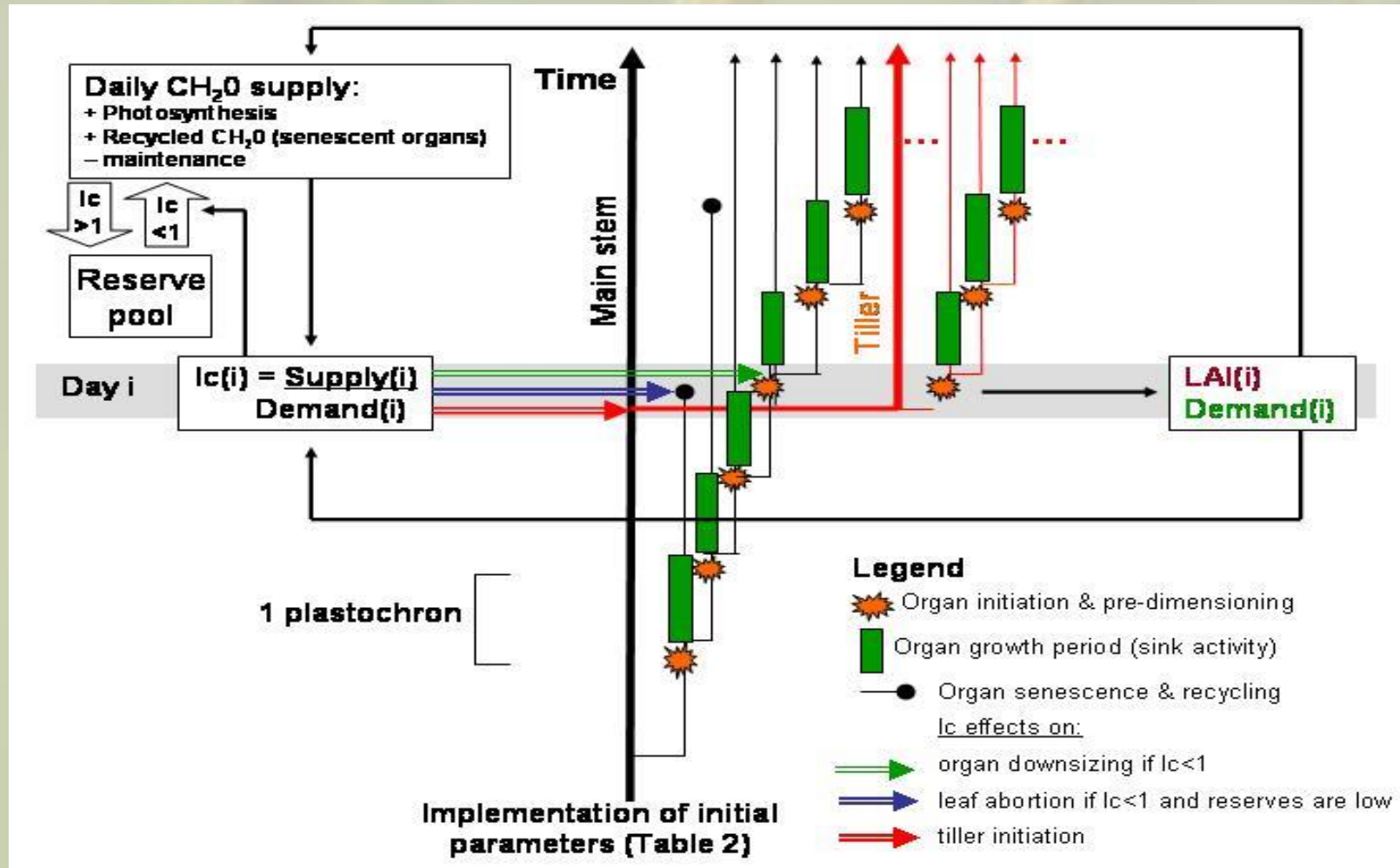
P. Oriol⁽¹⁾, M. Adam⁽¹⁾⁽³⁾, G. Aguilar⁽¹⁾, R. Pasco⁽²⁾, J.C. Soulié⁽¹⁾, M. Dingkhun⁽¹⁾⁽²⁾
1.UMR AGAP, CIRAD 2. IRRI 3.ICRISAT/INERA

About the model

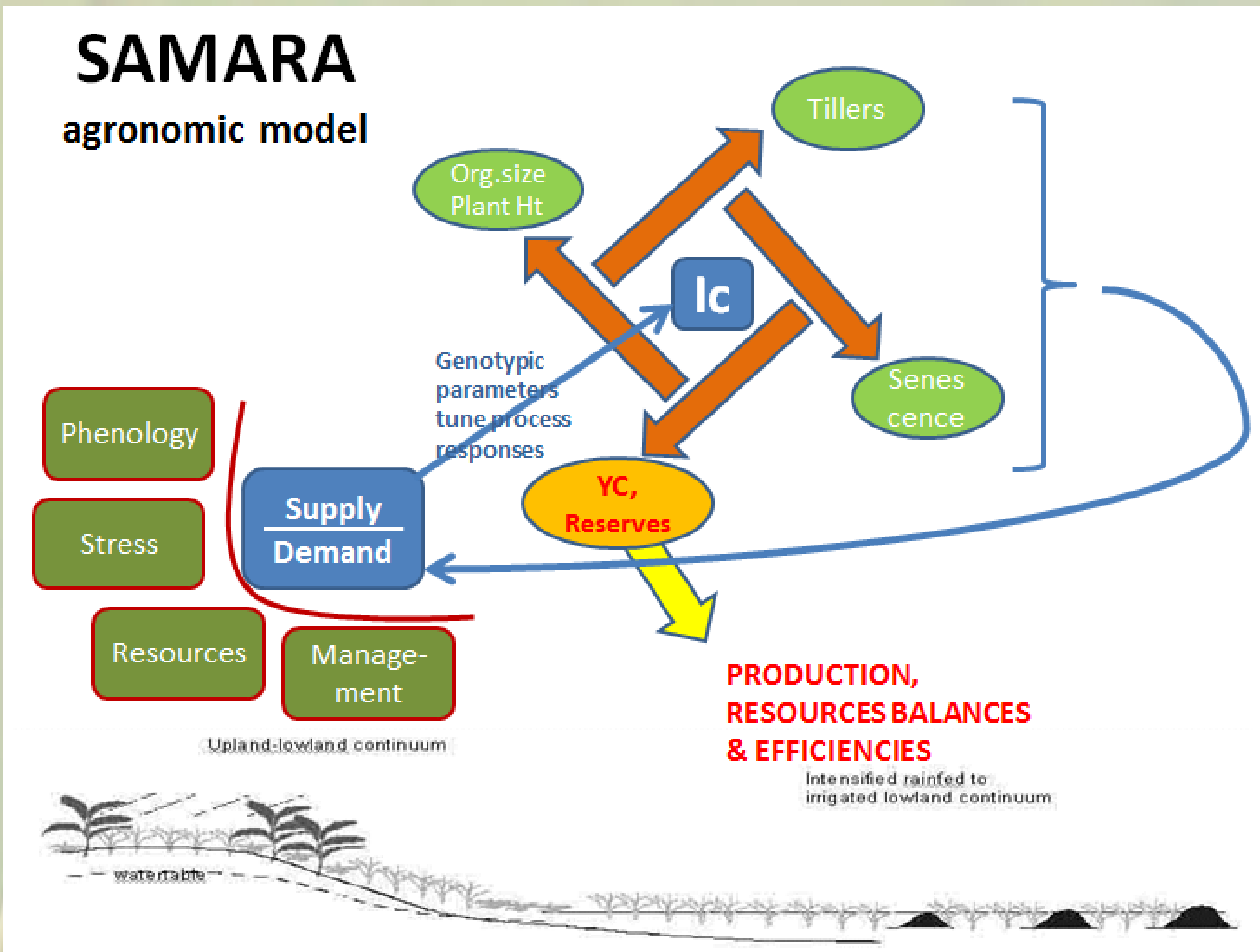
- A deterministic mono crop model for **GxExM** & **ideotype** exploration of **rice** (upl, rf-LL, irrig), and **sorghum** (grain, sweet, biomass)
- Simulation at population scale by extension of detailed simulation of individual plant
- Emphasis on adaptive plasticity based on inter-organ competition (*Ic*)
- Emphasis on water management and crop establishment



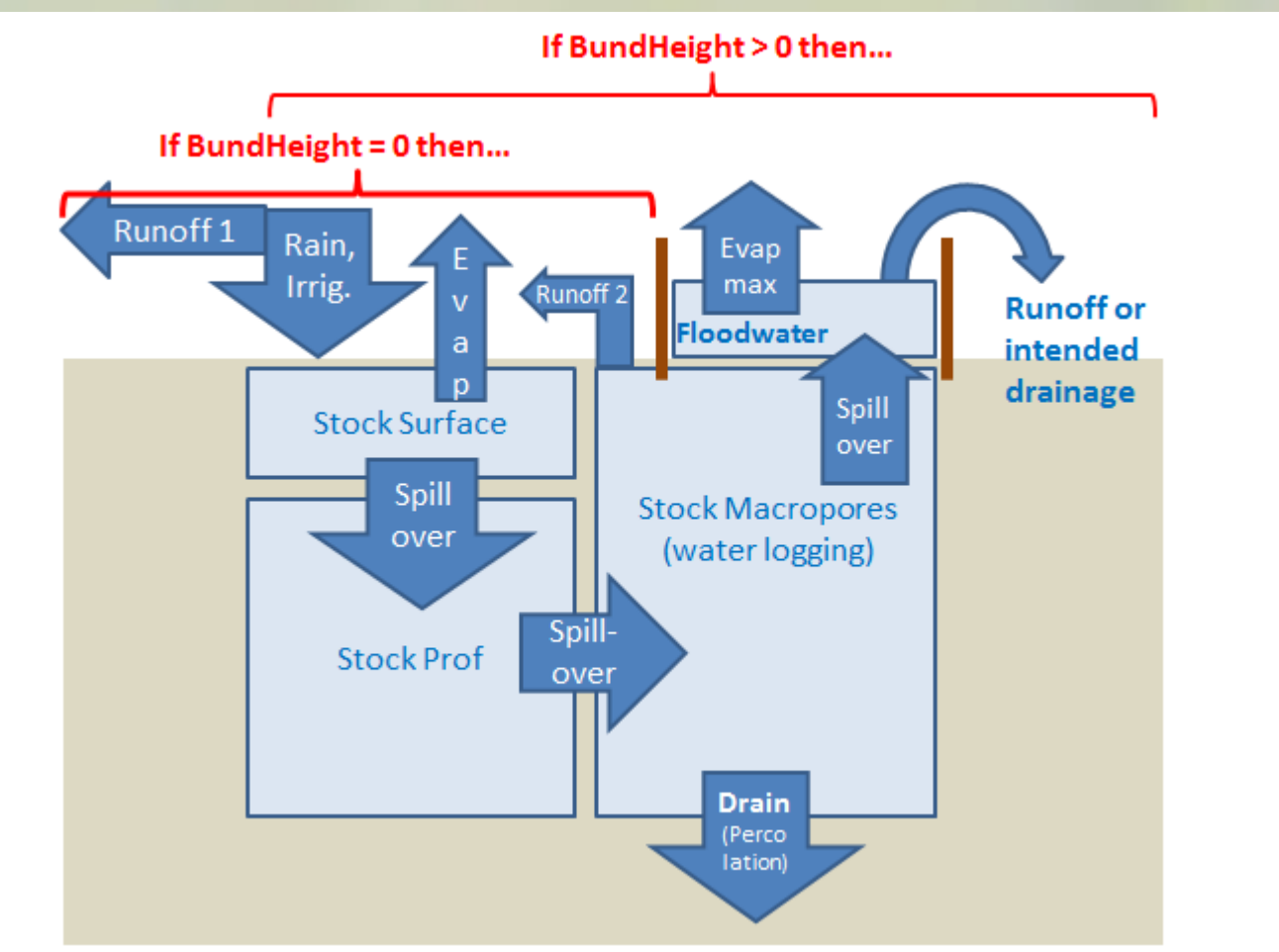
- SarraH crop model***
- Phenology
 - Carbon assimilation
 - Water Balance
 - Crop Management



- Ecomeristem FSCM****
- Simulation of phenotypic plasticity (GxE tillering, leaf senescence, plant height)
 - Competition for carbon resources, transitory reserve management
 - Drought responses (stomata sensitivity to FTSW, Leaf rolling, Senescence)



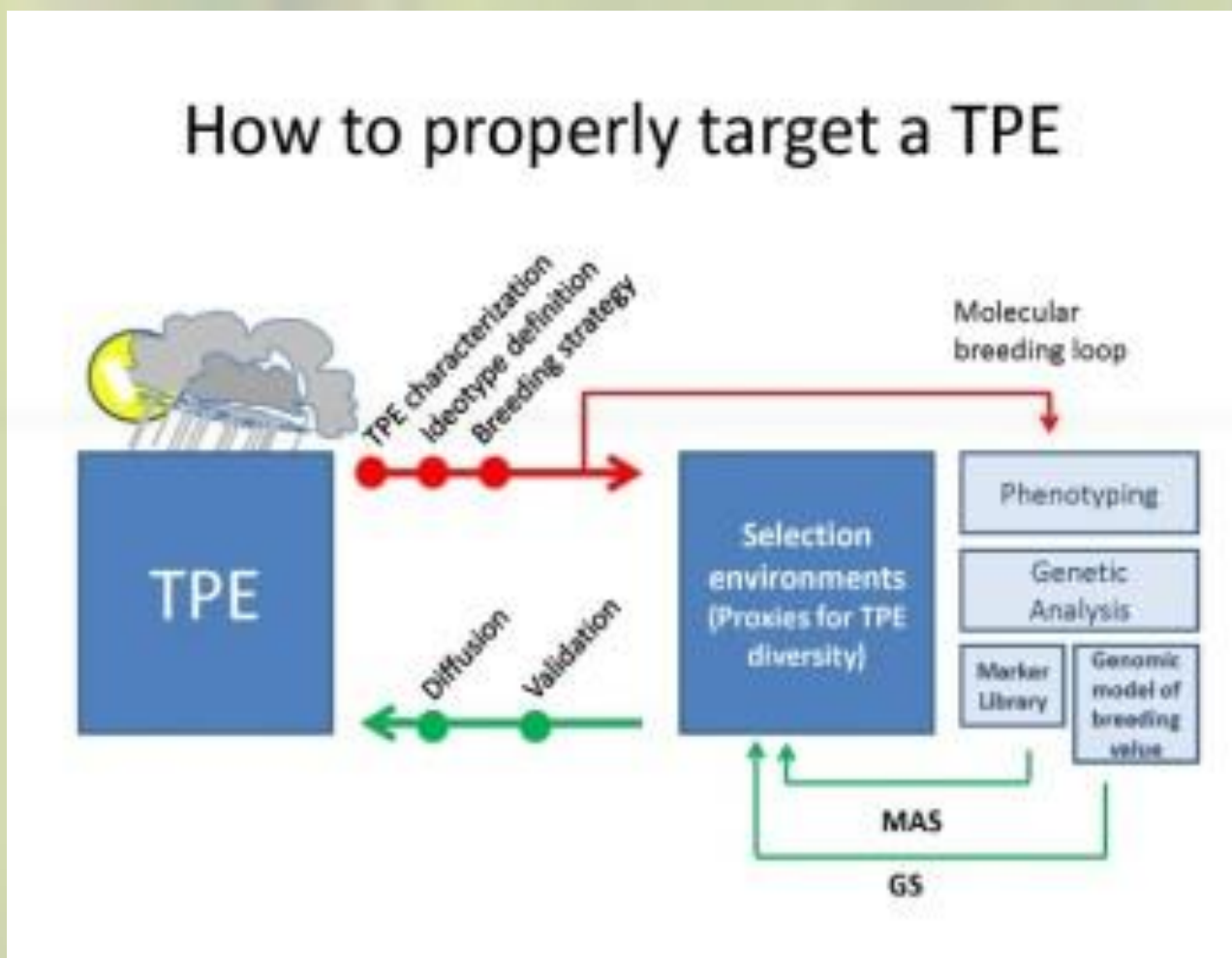
***Ic* = index of internal competition (sink/resources)**



- Adaptation to various rice water management
- Other adaptations : transplanting...

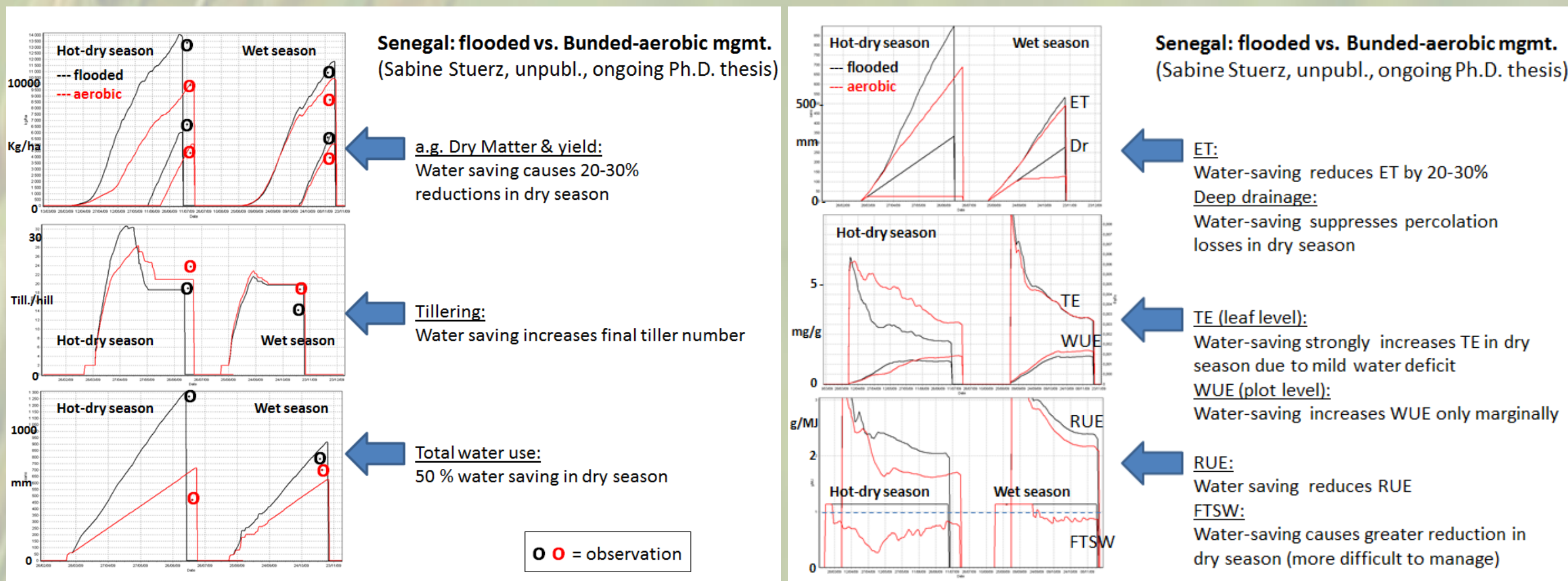
Some applications on rice

TPE characterization



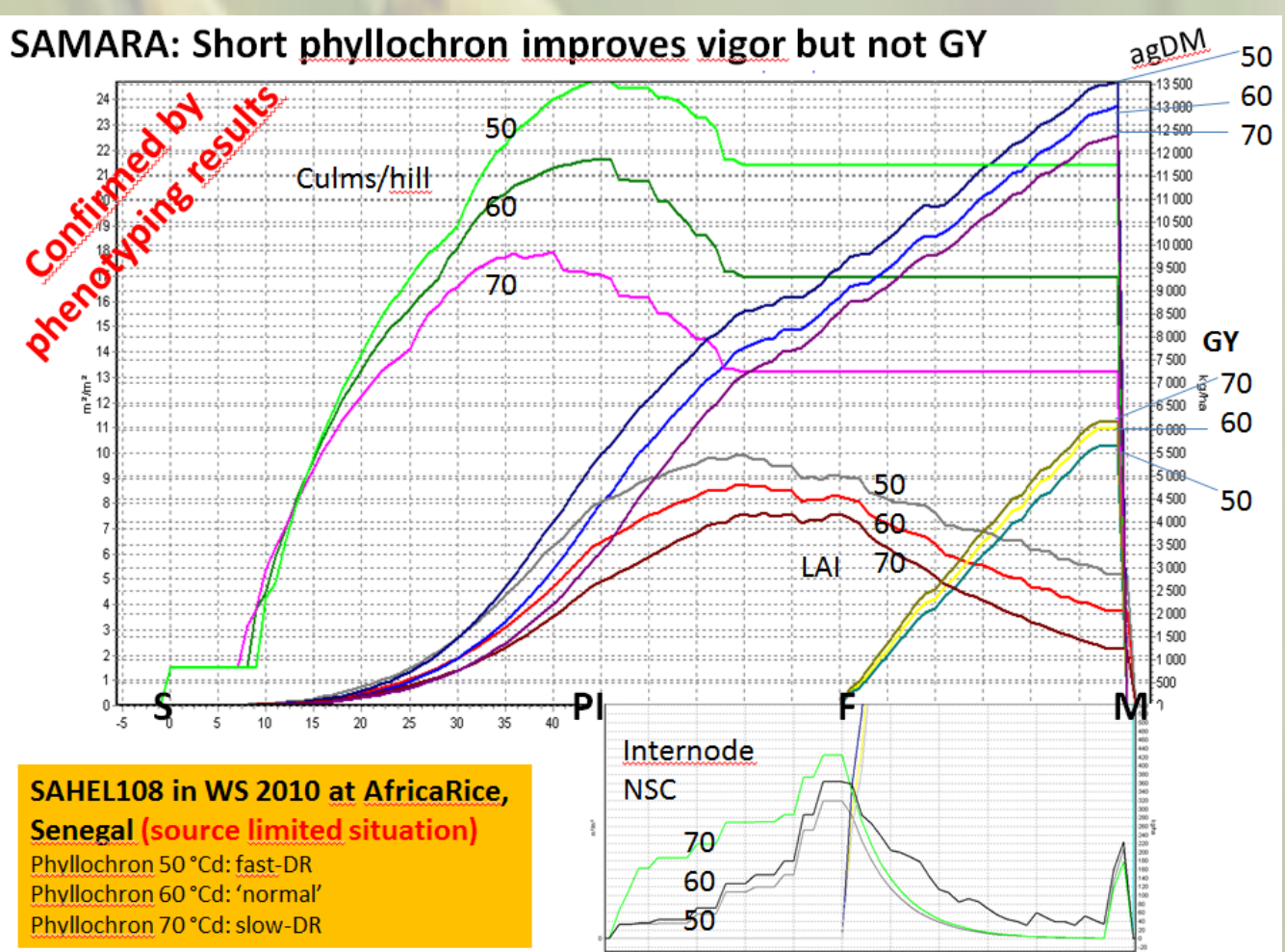
A pathway towards optimization of breeding objectives : Characterizing ExM diversity and GxExM interactions, e.g. finding trait combinations for desired performance under water limitation (upland rice projects)

Crop management optimization



A study comparing on flooded vs bundled-aerobic rice shows that bundled-aerobic practice reduces by 20-30% ET and reduces considerably deep drainage but does not increase WUE

Ideotype exploration



A study comparing three rice varieties having different development rates in Senegal shows that short phyllochrone improves plant vigor but not Grain Yield

Perspectives

- Model improvement - to be incorporated
- N not yet considered
 - CO2 atmospheric response
 - Panicle microclimate
 - Others?

On-going and future projects

- CIAT/CIRAD upland rice breeding for Latin America
- Embrapa upland rice TPEs
- Rice-CI AfricaRice/CIRAD
- Ideotype and breeding strategies for CC CCAFS Theme 1.2
- IRRI ideotypes for Yield Potential

* Baron C., Sultan B., Balme M., Sarr B., Traoré S.B., Lebel T., Janicot S., Dingkuhn M. 2005. From GCM grid cell to agricultural plot : Scale issues affecting modelling of climate impact. Philosophical transactions of the Royal Society of London. Biological sciences, 360 (1463) : 2095-2108.
**Luquet D., Dingkuhn M., Kim H.K., Tambour L., Clément-Vidal A.. 2006. EcoMeristem, a model of morphogenesis and competition among sinks in rice : 1. concept, validation and sensitivity analysis. Functional plant biology, 33 (4) : 309-323.